

Remarks

Applicant has filed this Amendment in response to the Office Action dated December 29, 2005. Claims 21, 24, 40, 49, 60 and 63 have been amended. Claims 1-19, 27-39, 44-46, 48, 55, 57-59 and 62 have been canceled without prejudice. New claims 68-69 have been added. Claims 20-26, 40-43, 47, 49-54, 56, 60-61 and 63-69 are currently pending. Reexamination and reconsideration are respectfully requested.

Claims 1-19, 27-39, 57-59, and 62 were previously canceled without prejudice. In this amendment, claims 44-46, 48 and 55 have also been canceled without prejudice.

Claim 20-26, 40-56, 60-61 and 63-67 were objected to. Claims 44-46, 48, and 55 have been canceled. The Examiner stated that "Claims 24, 40, 44, 60 and 63 each recite the subject matters of thermally treating "the dielectric layer", but fail to clarify that only a portion of the originally deposited dielectric layer remains in the recited "thermally treating" step." Applicant does not understand the objection. For example, claim 24, as amended, recites in part:

forming a dielectric layer in and above the trench;
planarizing the dielectric layer using the polishing stopper layer as a stopper;
removing the polishing stopper layer after the planarizing the dielectric layer;
removing the pad layer and exposing the first layer, after the removing the
polishing stopper layer;
forming a sacrificial oxide layer in direct contact with the first layer, after the
removing the pad layer, wherein the sacrificial oxide layer consists of an oxide layer
formed by thermally oxidizing the first layer;
thermally treating the dielectric layer at a temperature of at least 1050°C
after the forming the sacrificial oxide layer

Applicant respectfully submits that the claim language is clear as written. The claim language sets forth the order of the above elements, for example, "removing the polishing . . . after the planarizing", removing the pad . . . after the removing", forming a sacrificial . . . after the removing", thermally treating . . . after the forming". Applicant submits that it is not necessary to

further define an element every time any change is made to that element, as long as the claim language is clear. Applicant respectfully submits that claims 40, 44, 60 and 63 are similarly clear and that the objection to these claims and their dependent claims should be withdrawn.

Claim 21 was objected to as not further limiting the scope of claim 24. (Applicant notes that the Examiner apparently referred to claim 20 instead of claim 21). Claim 21 has been amended to address the objection.

Claims 20-26, 40-56, 60-61 and 63-67 were rejected under 35 U.S.C. 102(b) or 103(a) as unpatentable over U.S. Patent No. 6,051,480 to Moore et al. ("Moore"). Claims 44-46, 48 and 55 have been canceled without prejudice. The rejection of claims 20-26, 40-43, 47, 49-54, 56, 60-61, and 63-67 is respectfully traversed.

Applicant respectfully submits that the Examiner's citations to the art do not describe or suggest a method having all of the elements of independent claim 24, as amended, including, for example, "forming a sacrificial oxide layer . . . wherein the sacrificial oxide layer consists of an oxide layer formed by thermally oxidizing the first layer". The sacrificial layer of Moore, as cited by the Examiner, appears to include a deposited oxide layer that is formed on the semiconductor structure and on the trench filler oxide, whereas claim 24 recites that the "sacrificial oxide layer consists of an oxide layer formed by thermally oxidizing the first layer". As seen in the present application in the embodiment illustrated in Fig. 6(b) and in the specification at page 8, lines 6-8, for example, the sacrificial oxide 20 is a thermal oxide grown on the layer 12. Accordingly, for at least the above reason, applicant respectfully submits that the rejection of claim 24 and its dependent claims 20-23 and 25-26 is deficient and should be withdrawn.

Applicant respectfully submits that the Examiner's citations to the art do not describe or suggest a method having all of the elements of independent claim 40, as amended, including, for example, "forming a polishing stopper layer on an epitaxially grown semiconductor layer" and "conducting a thermal treatment of the dielectric layer after removing the polishing stopper layer, wherein the thermal treatment is conducted at a temperature of at least 1100°C". The Examiner cited Moore at col. 4, lines 57-67. Moore, at col. 4, lines 64-66, recites that "the as-deposited oxide layer is subjected to a heat treatment at a temperature above about 900°C. to densify the

deposited material." Applicant respectfully submits that the Examiner's citations to Moore do not describe or suggest thermally treating the dielectric layer at a temperature of at least 1100°C, as recited in claim 40. First, Moore describes the purpose of the heating as to densify the as-deposited oxide layer. Second, Moore does not recite at a temperature of at least 1100°C. Third, Moore appears to be concerned with densifying the as-deposited sacrificial oxide layer. Fourth, Moore makes no recognition that for an epitaxial layer as recited in claim 40, a heat treatment temperature of at least 1100°C provides for a substantial improvement in junction leak properties for narrow trench width structures. For instance, as described in the present specification at pages 10-11 and in Figs. 9-10, a thermal treatment of the dielectric layer at a temperature of 1100°C provided a substantially lower junction leakage current for narrow trench widths than a thermal treatment at a temperature of 1000°C. In view of the above, applicant respectfully submits that the Examiner's citations to the art do not describe, and would not motivate one of ordinary skill, to perform a method including all of the elements of claim 40, as amended. Accordingly, applicant respectfully submits that for at least the above reasons, the rejection of claim 40 and its dependent claims 41-43, 47, 49-55, and 56, is deficient and should be withdrawn.

Applicant respectfully submits that the rejection of claim 60 and its dependent claim 62 should be withdrawn for at least similar reasons as claim 40.

Applicant respectfully submits that the rejection of claim 63 and its dependent claims 64-67 should be withdrawn for at least similar reasons as claims 24 and 40.

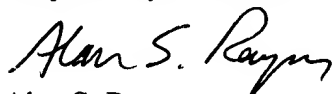
New claims 68-69 have been added. It is believed that no new subject matter has been added. Support for these claims may be found throughout the specification, figures, and original claims. Examination is respectfully requested.

The Office Action also included various comments concerning the art and the non-patentability of features in certain of the claims. Applicant notes that the Examiner's comments in the Office Action that have not been specifically discussed above are deemed moot at this time in view of this response.

Applicant respectfully submits that the pending claims are in patentable form. Reexamination and reconsideration are respectfully requested. If, for any reason, the application

is not in condition for allowance, the Examiner is requested to telephone the undersigned to discuss the steps necessary to place the application into condition for allowance.

Respectfully submitted,



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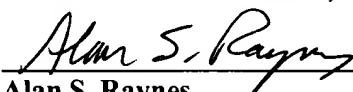
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Alan S. Raynes

March 24, 2006
(Date)